CERTIFICATE OF COMPLIANCE
FOR RADIOACTIVE MATERIAL PACKAGES

1. a. CERTIFICATE NUMBER	b. REVISION NUMBER	c. DOCKET NUMBER	d. PACKAGE IDENTIFICATION NUMBER	PAGE		PAGES
9293	2	71-9293	USA/9293/B(U)F-85	1	OF	9

2. PREAMBLE

   a. This certificate is issued to certify that the package (packaging and contents) described in Item 5 below meets the applicable safety standards set forth in Title 10, Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material."

   b. This certificate does not relieve the consignor from compliance with any requirement of the regulations of the U.S. Department of Transportation or other applicable regulatory agencies, including the government of any country through or into which the package will be transported.

3. THIS CERTIFICATE IS ISSUED ON THE BASIS OF A SAFETY ANALYSIS REPORT OF THE PACKAGE DESIGN OR APPLICATION

   a. ISSUED TO *(Name and Address)*

   Transnuclear, Inc.
   7135 Minstrel Way
   Columbia, MD 21045

   b. TITLE AND IDENTIFICATION OF REPORT OR APPLICATION

   Transnuclear, Inc., application dated May 19, 1999, as supplemented.

4. CONDITIONS

This certificate is conditional upon fulfilling the requirements of 10 CFR Part 71, as applicable, and the conditions specified below.

5.
(a) Packaging

(1) Model No. TN-68 Transport Package

(2) Description

The TN-68 is predominantly a steel package that is used to transport up to 68 intact BWR fuel assemblies with or without channels. The overall dimensions of the package are 271 inches long and 144 inches in diameter with the impact limiters installed.

The package generally consists of four components, the fuel basket assembly, a containment vessel within a forged steel cask body, a radial neutron shield, and impact limiters.

The basket assembly locates and supports the fuel assemblies, transfers heat to the cask body wall and provides neutron absorption to satisfy sub-criticality requirements. The basket structure consists of an assembly of stainless steel cells, joined by fusion welding of 1.75 inch wide stainless steel plates. Above and below the plates are slotted borated aluminum (or boron carbide/aluminum) metal matrix composite neutron poison plates which form an egg-crate structure. This construction forms a honey-comb like structure of cell liners which provides compartments for 68 fuel assemblies. The nominal dimensions of each cell is 6.0 inches x 6.0 inches.

A thick-walled (6.0 inch), forged steel cask body for gamma shielding surrounds the containment vessel, by an independent shell and bottom plate of carbon steel. The gamma shield completely surrounds the containment vessel inner shell and bottom closure. The thickness of the bottom of the cask body is 8.25 inches. A 4.5 inch thick steel gamma shield is also welded to the inside of the containment lid.

5.(a)(2) continued

The containment boundary consists of the inner shell and bottom plate, shell flange, lid outer plates, lid bolts, penetration cover plate and bolts and the inner metallic O-rings of the lid seal and the two lid penetrations (vent and drain). The containment vessel length is approximately 189 inches with a wall thickness of 1.5 inches. The cylindrical cask cavity has a nominal diameter of 69.5 inches and a length of 178 inches. The containment lid is 5 inches thick and is fastened to the cask body with 48 bolts. Double metallic O-ring seals are provided for lid closure. To preclude air in-leakage, the cask cavity is pressurized with helium to above atmospheric pressure. There are two penetrations through the containment vessel which are located in the lid. These penetrations are for draining and venting. Double metallic seals are also used on these two lid penetrations. The OP port provides access to the interspace lid seals for leak testing purposes. The OP transport cover is not part of the containment boundary.

Neutron shielding is provided by a borated polyester resin compound surrounding the gamma shield. The resin compound is cast into long, slender aluminum containers. The total thickness of the resin and aluminum is approximately 6 inches. The array of resin-filled containers is enclosed within a smooth 0.75 inch outer steel shell constructed of two half cylinders.

The package has impact limiters at each end of the cask body. The impact limiters consist of balsa wood and redwood blocks, encased in sealed stainless steel shells that maintain the wood in a dry atmosphere and provide wood confinement when crushed during a free drop. The impact limiters have internal radial gussets for added strength and confinement. The impact limiters are attaching to each other using 13 tie rods and to the cask by eight bolts attaching to brackets welded to the outer shell in eight locations (four bolting locations per impact limiter).

The approximate dimensions and weights of the package are as follows:

Overall length (with impact limiters, in)	271
Overall length (without impact limiters, in)	197
Impact Limiter Outside diameter, (in)	144
Outside diameter (without impact limiters, in)	98
Cavity diameter (in)	69.5
Cavity length (in)	178
Containment shell thickness (in)	1.5
Containment vessel length (in)	184
Body wall thickness (in)	7.5
Containment lid thickness (in)	5
Overall lid thickness (in)	9.5
Bottom thickness (in)	9.75
Resin and aluminum box thickness (in)	6
Outer shell thickness (in)	0.75
Overall basket length (in)	164
Maximum weight of package (pounds)	272,000
Maximum weight of BWR fuel contents (pounds)	47,900
Maximum weight of impact limiters and attachments (pounds)	32,000

5.(a)(3) Drawings

The package is constructed and assembled in accordance with TN drawings:

972-71-1, Revision 1
972-71-2, Revision 2
972-71-3, Revision 4
972-71-4, Revision 2
972-71-5, Revision 1
972-71-6, Revision 1
972-71-7, Revision 3
972-71-8, Revision 2
972-71-9, Revision 2
972-71-10, Revision 1
972-71-11, Revision 1
972-71-12, Revision 0
972-71-13, Revision 0
972-71-14, Revision 1

5.(b) Contents

(1) Type and form of material

Contents are limited to 68 unconsolidated intact irradiated GE BWR fuel assemblies with zircalloy cladding. An intact fuel assembly is a spent nuclear fuel assembly without known or suspected cladding defects greater than pinhole leaks or hairline cracks. Partial fuel assemblies (i.e. spent fuel assemblies from which fuel rods are missing), shall not be classified as intact fuel assemblies unless dummy fuel rods are used to displace an amount of water equal to that displaced by the original rod(s).

Spent nuclear fuel may be transported with or without channels. Any fuel channel thickness up to 0.120 is acceptable on any of the fuel designs shown below. The maximum initial rod pressurization is 155 psig. The maximum fuel assembly length is 176.2 inches and the maximum fuel assembly width is 5.44 inches.

Permissible fuel assemblies are limited as stated in table 1 (fuel types may be C, D, or S lattice):

5.(b)(1) continued

Table 1, Fuel characteristics

GE fuel generation	model	array	rod pitch	fuel rods	rod od	clad thick	pellet dia.	water rods	water rod od	water rod id	U content (MTU/ Assembly)	Max active fuel length
2A	2a	7x7	0.738	49	0.570	0.036	0.488	0	x	x	0.1977	144
2, 2B	2	7x7	0.738	49	0.563	0.032	0.487	0	x	x	0.1977	144
3, 3A, 3B	3	7x7	0.738	49	0.563	0.037	0.477	0	x	x	0.1896	144
4, 4A,4B	4	8x8	0.640	63	0.493	0.034	0.416	1	0.493	0.425	0.1880	146
5	5	8x8	0.640	62	0.483	0.032	0.410	2	0.591	0.531	0.1876	150
6, 6B	5	8x8	0.640	62	0.483	0.032	0.410	2	0.591	0.531	0.1876	150
7, 7B	5	8x8	0.640	62	0.483	0.032	0.410	2	0.591	0.531	0.1876	150
8, 8B -2w	82	8x8	0.640	62	0.483	0.032	0.411	2	0.591	0.531	0.1885	150
8, 8B-4W*	84	8x8	0.640	60	0.483	0.032	0.411	4	0.591	0.531	0.1824	150
8, 8B-4W**	84	8x8	0.640	60	0.483	0.032	0.411	4	0.483	0.431	0.1824	150
9, 9B	9	8x8	0.640	60	0.483	0.032	0.411	1	1.34	1.26	0.1824	150
10	9	8x8	0.640	60	0.483	0.032	0.411	1	1.34	1.26	0.1824	150
11	11	9x9	0.566	74	0.440	0.028	0.376	2	0.98	0.92	0.1757	146 full, 90 partial
13	11	9x9	0.566	74	0.440	0.028	0.376	2	0.98	0.92	0.1757	146 full, 90 partial
12	12	10x10	0.510	92	0.404	0.026	0.345	2	0.98	0.92	0.1857	150 full, 93 partial

*2 large water rods
**2 small water rods

Notes on table 1:

1. All dimensions in inches.
2. All fuel channels 5.278 inches inside, and from 0.065 to 0.120 inches thick.
3. All fuels are evaluated with 96.5% theoretical density and 3.7 wt% U-235 average enrichment.
4. The fuel pitch is for C and D lattice designs. The S lattice fuels have a smaller pitch, which is less reactive.
5. The fuel designs designated by GE as 6, 6B, 7, and 7B are sometimes referred to as "P" (pressurized) and "B" (barrier).

Provided all of the requirements of this section are met, the bounding fuel characteristics are: a) maximum initial lattice-average enrichment is 3.7%; b) the mnimum initial bundle average enrichment is 3.3%; c) the maximum assembly average burnup is 40,000

5.(b)(1) continued

MWD/MTU; d) the minimum cool time is 10 years; and e) the maximum heat load per assembly is 0.313 Kw.

Fuel assemblies are categorized into three types, Type I, Type II and Type III. There are two basic loading configurations for the package. The first configuration is a mixture of Type I and Type II fuel assemblies. The second configuration is Type III fuel assemblies. The maximum burnup, minimum initial enrichments and cooling times for each of the three fuel assembly types is contained in the tables below.

In the mixed Type I and Type II configuration, Type I assemblies shall be placed only into the interior compartments of the fuel basket as shown in figure 5.3-3 of the application. Type II fuel assemblies may be placed in any basket fuel compartment.

In the second configuration, Type III fuel assemblies may be placed in any basket fuel compartment.

Acceptable cooling time as a function of maximum burnup and minimum initial enrichment and BWR Cooling times (years)
TYPE I BWR Fuel

Burnup (GWd/MTU)

Initial Enrichment (bundle ave %w)	15	20	30	32	33	34	35	36	37	38	39	40
1.0	10	10										
1.1	10	10										
1.2	10	10										
1.3	10	10										
1.4	10	10										
1.5	10	10	10	10	11	11	11					
1.6	10	10	10	10	10	11	11	11				
1.7	10	10	10	10	10	11	11	11	12			
1.8	10	10	10	10	10	11	11	11	11	12		
1.9	10	10	10	10	10	11	11	11	11	12		
2.0	10	10	10	10	10	10	11	11	11	12	12	
2.1	10	10	10	10	10	10	11	11	11	12	12	12
2.2	10	10	10	10	10	10	11	11	11	12	12	12
2.3	10	10	10	10	10	10	11	11	11	11	12	12
2.4	10	10	10	10	10	10	10	11	11	11	12	12
2.5	10	10	10	10	10	10	10	11	11	11	12	12
2.6	10	10	10	10	10	10	10	11	11	11	12	12
2.7	10	10	10	10	10	10	10	10	11	11	11	12
2.8	10	10	10	10	10	10	10	10	10	11	11	12
2.9	10	10	10	10	10	10	10	10	10	11	11	12
3.0	10	10	10	10	10	10	10	10	10	10	11	12
3.1	10	10	10	10	10	10	10	10	10	10	11	12
3.2	10	10	10	10	10	10	10	10	10	10	10	11
3.3	10	10	10	10	10	10	10	10	10	10	10	10
3.4	10	10	10	10	10	10	10	10	10	10	10	10
3.5	10	10	10	10	10	10	10	10	10	10	10	10
3.6	10	10	10	10	10	10	10	10	10	10	10	10
3.7	10	10	10	10	10	10	10	10	10	10	10	10

Acceptable cooling time as a function of maximum burnup and minimum initial enrichment and BWR Cooling times (years)
TYPE II BWR Fuel

Burnup (GWd/MTU)

Initial Enrichment (bundle ave %w)	15	20	30	32	33	34	35	36	37	38	39	40
1.0	18	21										
1.1	17	20										
1.2	17	20										
1.3	17	20										
1.4	17	20										
1.5	16	19	25	26	26							
1.6	16	19	25	26	26							
1.7	16	19	25	25	26	26	27					
1.8	16	19	24	25	26	26	27	27				
1.9	16	19	24	25	25	26	27	27				
2.0	16	18	24	25	25	26	26	27	28			
2.1	15	18	23	25	25	26	26	27	27			
2.2	15	18	23	25	25	25	26	27	27			
2.3	15	18	23	24	25	25	26	26	27	27		
2.4	15	18	22	24	24	25	26	26	27	27		
2.5	15	17	22	24	24	25	25	26	26	27		
2.6	15	17	22	24	24	24	25	26	26	27		
2.7	15	17	22	24	24	24	25	26	26	26	27	27
2.8	14	17	22	23	24	24	25	25	26	26	27	27
2.9	14	17	22	23	23	24	24	25	26	26	27	27
3.0	14	17	21	23	23	23	24	25	25	26	27	27
3.1	14	17	21	23	23	23	24	25	25	26	27	27
3.2	13	16	21	23	23	23	24	24	25	25	26	27
3.3	13	16	21	23	22	23	23	24	25	25	26	26
3.4	13	16	21	23	22	23	23	24	25	25	26	26
3.5	13	16	21	22	22	23	23	24	25	25	26	26
3.6	13	16	21	21	22	22	23	24	25	25	26	26
3.7	12	15	20	21	22	22	23	24	25	25	25	26

Acceptable cooling time as a function of maximum burnup and minimum initial enrichment and BWR Cooling times (years)
TYPE III BWR Fuel

Burnup (GWd/MTU)

Initial Enrichment (bundle ave %w)	15	20	30	32	33	34	35	36	37	38	39	40
1.0	10	11										
1.1	10	11										
1.2	10	10										
1.3	10	10										
1.4	10	10										
1.5	10	10	15	16	16	17	17					
1.6	10	10	14	16	16	17	17	17				
1.7	10	10	14	15	16	16	17	17	17			
1.8	10	10	14	15	15	16	16	17	17	18		
1.9	10	10	14	15	15	16	16	17	17	18		
2.0	10	10	14	15	15	16	16	16	17	17	18	
2.1	10	10	14	15	15	15	16	16	16	17	18	18
2.2	10	10	13	14	15	15	16	16	16	17	17	18
2.3	10	10	13	14	15	15	16	16	16	17	17	18
2.4	10	10	13	14	15	15	15	16	16	17	17	18
2.5	10	10	13	14	14	15	15	16	16	16	17	18
2.6	10	10	13	14	14	15	15	16	16	16	17	17
2.7	10	10	13	14	14	15	15	15	16	16	17	17
2.8	10	10	13	13	14	14	15	15	16	16	17	17
2.9	10	10	13	13	14	14	15	15	15	16	16	17
3.0	10	10	12	13	14	14	14	15	15	16	16	17
3.1	10	10	12	13	14	14	14	15	15	15	16	16
3.2	10	10	12	13	14	14	14	15	15	15	16	16
3.3	10	10	12	13	13	14	14	14	15	15	16	16
3.4	10	10	12	13	13	13	14	14	15	15	16	16
3.5	10	10	12	13	13	13	14	14	14	15	15	16
3.6	10	10	12	12	13	13	14	14	14	15	15	15
3.7	10	10	12	12	13	13	14	14	14	15	15	15

5.(b) continued

(2) Maximum quantity of material per package

The maximum contents weight is 75,600 pounds. The maximum weight of the irradiated fuel contents is 47,900 pounds.

(3) Decay Heat Limit

Maximum decay heat per package not to exceed 21.2kW. The maximum heat load per assembly is 0.313 kW/assembly.

(c) Criticality Safety Index 0.0

6. In addition to the requirements of Subpart G of 10 CFR Part 71:

(a) Each packaging must meet the Acceptance Tests and Maintenance Program of Chapter 8 of the application, as supplemented.

(b) The package shall be prepared for shipment and operated in accordance with the Operating Procedures of Chapter 7 of the application, as supplemented.

7. Known or suspected fuel assemblies with cladding defects greater than pin hole leaks and or hairline cracks are not authorized.

8. The package authorized by this certificate is hereby approved for use under the general license provisions of 10 CFR 71.17.

9. Revision No. 1 of this certificate may be used until February 28, 2007.

10. Expiration date: February 28, 2011.

REFERENCES

Transnuclear, Inc., application dated May 19, 1999.

Supplements dated March 2, October 18, and November 13, 2000, January 12, 2001, and January 20, 2006.

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Robert A. Nelson, Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Date: February 10, 2006

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION REPORT
Model No. TN-68 Transport Package
Certificate of Compliance No. 9293
Revision No. 2

On February 6, 2006, the U.S. Nuclear Regulatory Commission renewed Certificate of Compliance No. 9293, Revision No. 1, for the Model No. TN-68 Transport Package with the incorrect revision number. Revision No. 1 of the certificate was previously issued on March 14, 2001. The certificate is being reissued to reflect the correct revision number.

This change does not affect the ability of the package to meet the requirements of 10 CFR Part 71.

Issued with Certificate of Compliance No. 9293, Revision No. 2,
on February 10, 2006.